

628.1
C38
1869

Mystic Water Board.

1869.

EDWARD LAWRENCE,

JAMES DANA, *

FRANCIS CHILDS,

} From the Citizens
at Large.

ABEL E. BRIDGE,

From the Board of Aldermen.

THOMAS R. B. EDMANDS,

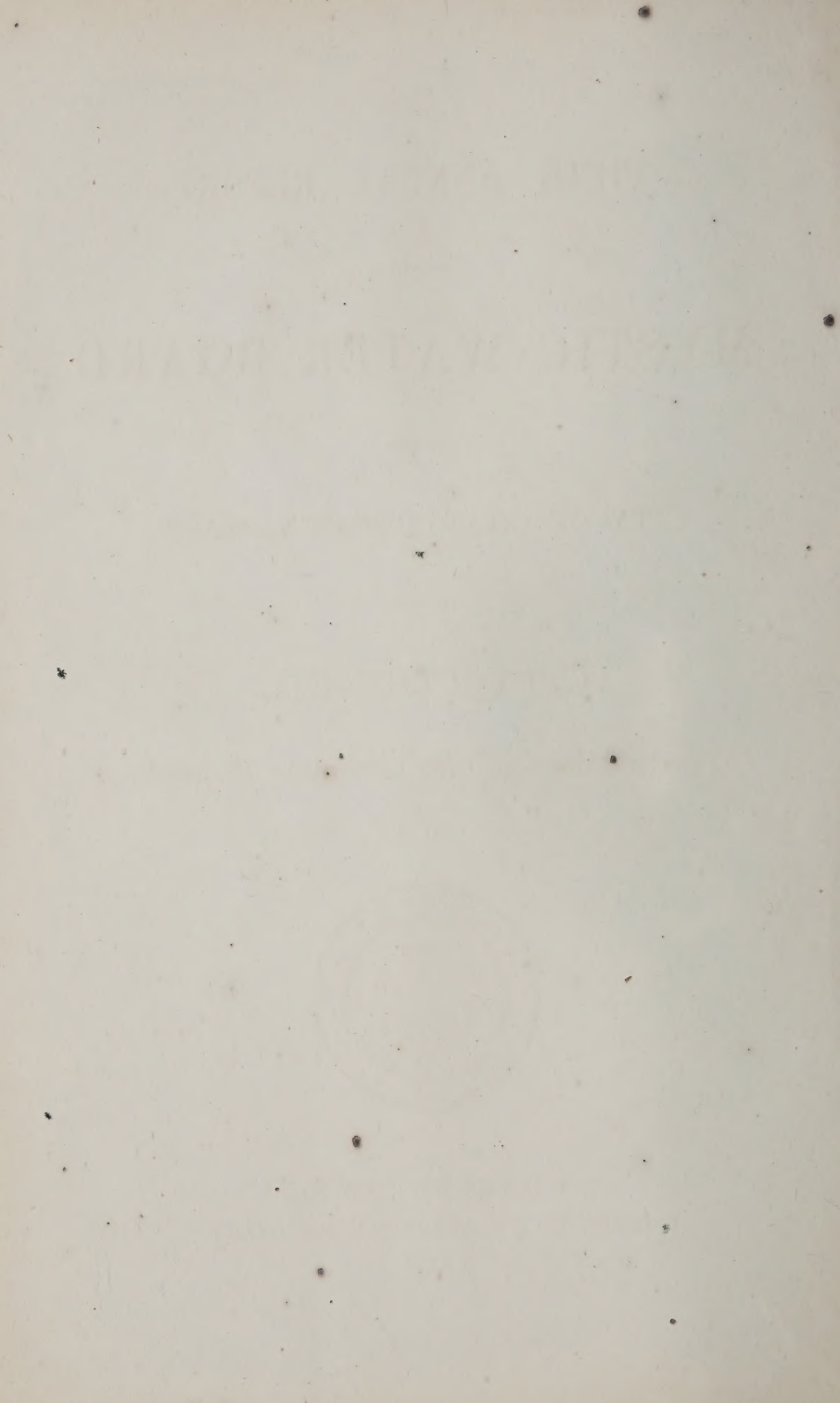
From the Common Council.

WILLIAM W. PEIRCE,

Clerk and Registrar.

CHARLES H. BIGELOW,

Superintendent of the Works.



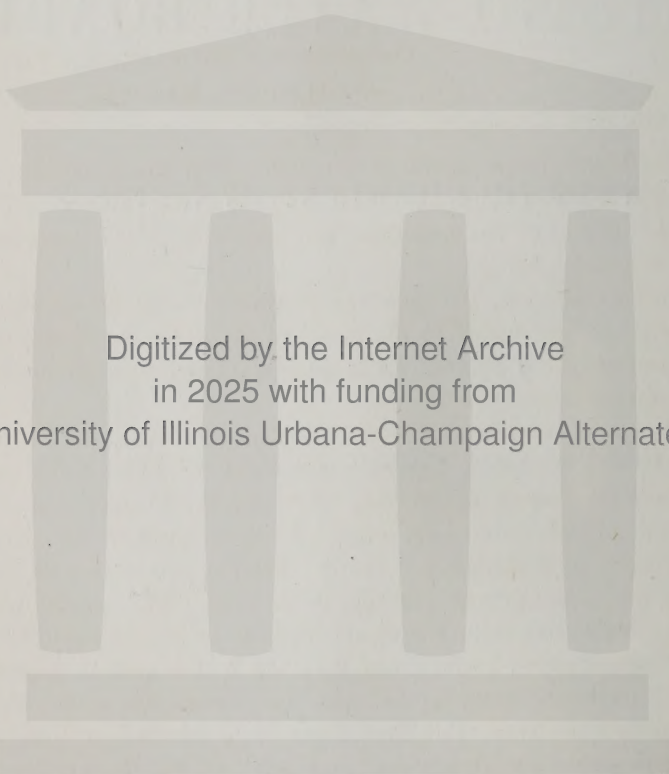
THE
FIFTH ANNUAL REPORT
OF THE
MYSTIC WATER BOARD
OF THE
CITY OF CHARLESTOWN, MASS.,
TO THE
CITY COUNCIL,

For the Year ending December 31, 1869.



CHARLESTOWN:
PRINTED IN THE CHRONICLE JOB OFFICE.
1870.

THE LIBRARY OF THE
FEB 22 1946
UNIVERSITY OF ILLINOIS



Digitized by the Internet Archive
in 2025 with funding from
University of Illinois Urbana-Champaign Alternates

628.1

C38

1869

REPORT OF THE MYSTIC WATER BOARD.

OFFICE OF THE MYSTIC WATER BOARD,
CHARLESTOWN, MARCH 15, 1870.

TO THE CITY COUNCIL:

The Mystic Water Board, in compliance with the provisions of the City Ordinance, has the honor to present herewith the fifth Annual Report of the operations and condition of the important works in its charge.

During the year, the lake has furnished its usual abundant supply, and no change in the purity of the water is perceptible. We cannot be too grateful for a blessing so indispensably necessary for health and comfort.

The works are deemed to be in excellent condition. In consequence of a freshet, it became necessary to rebuild a wall, and regrade the roadway at the lake. A fence was also erected there, and the grounds put in good order. At the request of the Commissioners on Fisheries, a "Foster" fish-way was placed at the dam, which has proved satisfactory to them. The conduit has been examined its entire length, and found to be in good condition. The pipe-chamber having been unroofed by the gale, in August last, it was found necessary to re-tin and replace the roof. The bridge over the 36-in. mains was found to be decayed and unsafe, and new planks and girders were supplied. At the Engine-house, we have to report that the pumping-engines continue to perform the work in an entirely satisfactory manner. 859,565,733 gallons have been raised to the reservoir during the year.

A very desirable improvement has been effected by the erection of a coal-shed, having the capacity for the storage of 1000 tons, and connected with the boiler-house by a railway running its entire length. An alteration has also been made by changing the flue

from an indirect to a direct draft, which is found to be a decided improvement. A large Fairbanks platform scale has also been placed at the Engine-house, for the purpose of weighing all the coal purchased. These improvements have cost \$6,775 ; but the saving in labor, aside from the advantage of a proper storage place for coal, will exceed the amount of the interest on the outlay. The foundations of the force main pipes at the Engine-house having settled so as to render them unsafe, a thorough and substantial repair, at considerable expense, was made, and placed in such condition that no further difficulty is anticipated. In consequence of a change of grade in the grounds of the Tufts College adjacent to the reservoir, a portion of the road around the reservoir will need to be changed to conform to it. This has been partially done, and will be completed during the present year.

Arrangements have been made with the Trustees of the College whereby a right of way is granted in consideration of a supply of water for the corporation building. About seventy feet in length of 24-in. main pipe, and distribution and service pipes, have been laid at the expense of the College, enabling us to furnish a supply at the usual rates to the residences of the officers, in addition to the college building.

At the date of the last annual report of the Board, the subject of supplying the towns of Medford and Malden was under consideration, and the question of providing for a new main to be located through those towns was submitted.

These towns, having since made arrangements for a supply from Spot Pond, it is deemed advisable to change the location of the second supply main, and it is earnestly recommended that as soon as the Legislature shall grant permission, the City Council will authorize its immediate construction, with the view that it may be completed during the present year. Its importance, not only for the additional safety against accident it will afford, but for the increased facilities for furnishing a much larger supply, cannot be too highly estimated. The Town of Somerville has availed itself of the provision in the contract relative to the purchase of the distribution pipes laid in that town by the City of Charlestown, and has paid therefor the sum of \$13,000, as stipulated. It has also largely

increased the quantity of distribution pipes, and as a consequence, the number of water-takers has already more than doubled. Under this contract, as well as that with the City of Chelsea, the operations continue satisfactory, and, as we believe, mutually advantageous. In conformity with the agreement with the City of Boston, for furnishing Mystic Lake water to the inhabitants of East Boston, the water was let on to the Boston pipes on the 1st of January, and the supply is believed to be very satisfactory. With this addition, the water from Mystic Lake is now furnished to a population of about 90,000; and we have the great satisfaction to be enabled to report that, in a financial point, the works are entirely self-sustaining. The work of relaying the pipes across Mystic River at Malden Bridge was entrusted to George H. Norman, Esq., who has performed it in his usual thorough and substantial manner. Three hundred and sixteen new service-pipes have been entered during the year, and six thousand feet of distribution mains have been laid. Every year's experience gives additional confidence in the quality and durability of the iron and cement pipes. During the present year, it will doubtless be found necessary to continue the distributing mains through the streets that have been newly laid out or extended by the City Council.

The largely increased consumption of water during the past year reminds us of the necessity of strict care to prevent unnecessary waste; especially is it important where, as in our case, the expense of pumping makes an actual additional cost to the city for the amount of water wasted. The change in the tariff of water rates for the old style of hopper-closets, has had the effect to change a large number to the new style of self-acting. And as the additional cost of these is but two dollars, it is anticipated that builders and others will hereafter adopt them. There are now some four hundred and fifty of the old pattern in use in this city. In the opinion of the Board, it would be beneficial to the interests of the city to allow an amount equal to the difference in the original cost, in addition to the reduced rates, to all who will make the change. It is judged that this inducement would secure their application in the premises of all water-takers, and thus accomplish a very desirable object.

The Annual Reports of the Superintendent of the Works and the Clerk of the Board, who also performs the duty of Water Registrar, are herewith appended.

The services of these officers have been performed with an ability and fidelity that commends them to the favorable opinion of the Board.

COST OF MAINTENANCE OF THE WORKS.

Salaries	\$3,800 00	
Printing, advertising, and stationery .	450 54	
Rents and Heating	563 49	
Contingent expenses for labor, tools, and repairs	6,850 84	
Clerk hire	859 00	
		\$12,523 87

PUMPING SERVICE.

Fuel	\$14,554 86	
Oil, tallow, tools, etc.	1,294 96	
Pay of Engineer, firemen, and laborers	3,395 86	
		19,245 68
		\$31,769 55
Deduct for quantity of coal on hand in excess of the amount, Jan. 1, 1869, 370 tons, at \$9		3,330 00
		\$28,439 55

EXPENDITURES AND RECEIPTS ON ACCOUNT OF THE WORKS TO JANUARY 1, 1870.

Construction account	\$1,076,747 33	
Interest account	270,958 86	
Maintenance account	109,775 83	
		\$1,457,482 02

RECEIPTS.

Water rates	\$322,405 79	
Accrued interest and premiums . .	19,894 14	
Sundry credits for materials . .	18,955 16	
Taxes assessed for interest . .	38,000 00	
		399,255 09
Net indebtedness on account of the works . .		\$1,058,226 93

Of the amount of the indebtedness, the city of Chelsea pays the interest, at six per cent. per annum, on \$38,840.20.

Respectfully submitted.

EDWARD LAWRENCE,
JAMES DANA,
FRANCIS CHILDS,
ABEL E. BRIDGE,
THOS. R. B. EDMANDS.

REPORT OF THE CLERK
OF THE
MYSTIC WATER BOARD,
FOR THE YEAR 1869.

REPORT OF THE CLERK.

OFFICE OF THE MYSTIC WATER BOARD,
CHARLESTOWN, MARCH 5, 1870.

EDWARD LAWRENCE, ESQ., *President Mystic Water Board:*

SIR, — The Annual Report of the Clerk for the year 1869, made in conformity with the City Ordinance, is herewith submitted: —

The number of water-takers, registered January 1, 1870, was 9,560, distributed as follows: Charlestown, 3,740; Chelsea, 2,200; Somerville, 598; East Boston, 3,022.

During the year 1869, the water was supplied as follows, viz: —

	Dwelling Houses.	Families.	Stores and Shops	Manu- factories.	Stables.
Charlestown.....	3448	5628	243	39	172
Chelsea.....	1647	2116	114	11	69
Somerville	552	672	11	2	43
Total.....	5647	8416	368	52	284

The water has also been supplied for 12 tug-boats, 12 fire-engine and hose-houses, 53 public schools, 22 saloons, 58 offices, 13 churches, 4 armories, 4 hotels, 3 railroads, 1 brewery, 3 tanneries, 2 gas houses, 1 sugar-refinery, 1 distillery, 1 pottery, 1 drain-pipe factory, 1 glass factory, 1 coal-oil company, 1 chemical works, the Navy Yard, Naval Magazine, Naval Hospital, U. S. Marine Hospital, State Prison, McLean Asylum, 2 City Halls, and the Chelsea Ferry Co.

The amount of receipts for water-rates has been as follows: For 1868, \$7,105.14; making the total amount for that year, including Chelsea, \$84,936.61. The amount of water-rates received for 1869 was: From Charlestown, \$64,996.26; Somerville, net amount, \$5,586.73; Chelsea, net amount, \$23,030.70; and there was due for water-rates for that year, \$9,264.40; making the total water-rates

for 1869, \$102,878.09. The aggregate amount of water-rates to January 1, 1870, is \$322,405.79.

The expenses of the office for 1869, including all the charges for collections and care in Chelsea and Somerville, were \$1,309.54, viz: For clerk hire, \$859.00; for printing, stationery, and advertising, \$450.54.

Statement showing the number and kind of water-fixtures contained within the premises of water-takers, to January 1, 1870.

	Bath Tubs.	Water Closets.		Uri- nals.	Foun- tains	Sinks.	Wash Hand Basins.	Taps.	Private Hy- drants.
		Pan.	Hopper						
Charlestown	408	446	523	21	3	5246	929	1154	107
Chelsea.....	170	194	30	..	4	2330	224	165	30
Somerville.....	132	162	115	15	2	640	144	138	21
Total.....	710	802	668	36	9	8216	1297	1457	158

The number of places shut off for non-payment of the water rates was 65,—49 of which have been let on again. The amount collected for off and on water and fires was \$221.

Statement showing the number and sizes of Meters in use, January 1, 1870.

WHERE APPLIED.	SIZE OF METERS.					Total.
	$\frac{3}{4}$ -inch.	1-inch.	2-inch.	3-inch.	4-inch.	
U. S. Navy Yard					2	
State Prison					1	
Union Sugar Refinery		4	1			
Marine Barracks				1		
Boston and Maine Railroad			1			
Eastern Railroad.....			2			
Eastern Cattle Station.....			1			
Fitchburg Railroad.....			2			
Middlesex Horse Railroad	2					
Bunker Hill Brewery		1				
C. Guild & Son		1				
Charlestown Gas Company	2	1				
Ezra Trull & Co.....		1				
Thomas Cunningham.....		1				
Cook, Rymes & Co.....		1				
Tudor Co.....			1			
F. M. Holmes & Co.....			1			
Ashbel Waitt.....	1					
Amos Brown.....	1					
George S. Hall	1					
M. B. Sewall.....	1					
Carried forward.....	8	10	9	1	3	31

WHERE APPLIED.	SIZE OF METERS.					
	$\frac{3}{8}$ -inch.	1-inch.	2-inch.	3-inch.	4-inch.	Total.
<i>Brought forward</i>	8	10	9	1	3	31
F. C. Sewall	1					
Stickney & Poor.....	1					
A. Waterman	1					
Mass. Glass Co.....	1					
Oriental Oil Co.....		1				
John P. Barnard	1					
John B. Dearborn	2					
Wm. S. & G. O. Wiley	1					
Wm. H. Chapman	1					
Union Stable Company	1					
Boston Ice Company	1					
Merriam & Norton.....	1					
O. Callahan	1					
Wm. Underwood & Co.....	1					
Waverley House		2	1			
Waverley Market	1					
Moore & Rideout.....	1					
Lockwood Brothers		1				
Wemyss Brothers	1					
C. C. Perkins.....	1					
Maynard Brothers.....	1					
Page & Littlefield.....	1					
J. T. Reed & Co	1					
Tufts Brothers.....	1					
Mass. Brick Co., Somerville			1			
Amos Haynes, Somerville.....	2					
B. W. Patten, Somerville	1					
Skilton, Foote & Co., Somerville.	1					
Lowell R. R. Cattle Station, do...		1				
American Tube Works, do.....			1			
Bleachery, Somerville					1	
N. E. Chemical Co., Malden.....			1			
Magee Furnace Co., Chelsea		1				
Ammonia Works, Chelsea		1				
Boston Elastic Fabric Co., do...			1			
White & Co., Chelsea.....	1					
H. B. Farwell & Co., Chelsea....	1					
Stephen Sibley, Chelsea			1			
Chelsea Ferry Co., Chelsea.....				1		
U. S. Naval Hospital, Chelsea ...			1			
U. S. Marine Hospital, Chelsea..			1			
G. L. Stearns, Medford	1					
Mass. Brick Co., Medford.....			1			
Mystic Riding Park, Medford ...			1			
	37	17	19	2	4	79

Respectfully submitted,

WM. W. PEIRCE,

Clerk.

ANNUAL REPORT
OF THE
SUPERINTENDENT
OF THE
CHARLESTOWN WATER WORKS,
1869.

REPORT OF THE SUPERINTENDENT.

CHARLESTOWN, Jan. 15, 1870.

EDWARD LAWRENCE, Esq., *President Mystic Water Board*:

SIR:—In compliance with the city ordinance, I herewith respectfully submit the Annual Report of the Superintendent, for 1869.

The works are in excellent condition; in fact, with the improvements which have been made during the year, more especially on that section from the lake to the reservoir, they were never in better condition than at the present time. The supply has been ample and uninterrupted during the year, except in two instances (on the 19th of September, and the 29th of December), when the water was shut off at the reservoir, for a short time, for the purpose of making repairs at the gate-house, and for renewing and re-arranging the screens. In the latter case, through the courtesy of the Cochituate Water Board, a supply was obtained from their works by the connection made to supply East Boston, so that but few of the water-takers suffered any inconvenience.

LAKE.

The lake has yielded its usual abundant supply of water during the year, the average depth on the overfall having been $4\frac{7}{8}$ inches. The greatest depth was twenty inches, in February; and the smallest, in August; the season being very dry, but very little water passed over during that month. The dam has remained in perfect order during the year. The driveway, from the main road to the dam, has been much improved by being widened, and having the grade raised. A substantial stone wall has been built on the boundary line, and surmounted by a neat railing, the whole adding much to its appearance, and making it more convenient and easy as a driveway. The substantial fish-way that was built in 1868 has not proved a success, the fish ignoring it entirely. A temporary one, on a different plan, was built by the fish commissioners, which

seemed to work well while the season lasted ; after which a larger and more permanent one was built, on a similar plan, by order of the Board ; but nothing can be said as to its success until another season. The most that can be said about fish-ways at present is, that they are expensive, and not very successful, being entirely a matter of experiment.

CONDUIT.

The conduit was thoroughly examined in November, and found to be in very good order throughout, as also the two 36-inch iron pipes under the river, from the pipe-chamber to the pump-well, in the engine-house. Considerable vegetable matter had accumulated between the gate-house and the waste weir ; but from that point to the pipe-chamber, it was almost entirely free from any deposit whatever.

The screens at the pipe-chamber have been entirely renewed and re-arranged. A heavy oak frame has been placed in the chamber, and firmly secured in place. In this frame are two sets of grooves, in which run a double set of screens. In this way, the screens are easily removed at any time, for cleaning or repair, one set always remaining in place while the other is out. The wire-work of these screens is much heavier than before, being made of the largest copper wire that could be used and retain the same mesh as the old screens. At the head gate-house, the copper wire-work to the screens has been removed, and replaced by heavy iron wire (galvanized), of a much coarser mesh than before, thus allowing a freer passage to the water, and enabling them to withstand the pressure and current of the water much better, which at this place is very strong.

The bridge across Mystic River between the engine-house and pipe-chamber, was examined in October, and the cross-ties and girders, and also the flooring, were found to be badly decayed. It has since been thoroughly repaired.

ENGINE-HOUSE.

Everything in and about the engine-room is in good order. The engines are in excellent condition, and have performed their duty in the most satisfactory manner, requiring only the usual repairs

incident to such work. They have been run alternately 365 days, or every day in the year, and on an average 11.2 hours per day; making 11,163,329 strokes, and pumping 859,565,733 gallons of water, using 1,951,700 pounds of coal in pumping; being an increase of 18.2 per cent in the number of hours, 30.6 per cent in the amount of water pumped, and 4.9 per cent in the amount of coal used in pumping, and showing an effective duty of 532,861 pounds of water raised one foot high per pound of coal.

There was also used 589,960 pounds of coal in firing and banking, or 23.2 per cent of the whole amount of coal used. There was a loss of 11.3 per cent by ashes and clinkers.

Several improvements have been made at the engine-house during the year; the two most important of which were the erection of a coal-shed, and the construction of a new flue from the boilers to the chimney.

The coal-shed is located on the easterly side of the engine-house, directly opposite the boiler-room, with which it is connected by a tunnel, which runs under and across the passage-way between the two. It was constructed by excavating into the embankment so that the floor on the lower end is on a level with the boiler-room floor, and the roof on the upper end is on a level with the roadway, so that teams drive directly on and dump the coal through scuttles into the shed below, from which it is carried to the fire-room on a car that runs on a track that is laid the entire length of the shed, through the tunnel, and across the boiler-room directly in front of the furnaces. The car also passes over a Fairbanks platform scale, located in the shed, the coal all being weighed before it enters the fire-room. A ten-ton platform scale is also located in the roadway near the shed, all the coal being weighed as it arrives, and before it enters the shed. The shed is built in the most thorough and substantial manner, and is calculated to hold easily one thousand tons of coal, and is not only a very convenient arrangement, but a very decided improvement over the old method, in probably saving a large per cent in waste of coal by protecting it from the weather; but, more especially, in the manner of conveying the coal to the furnaces, by which we dispense with the old coal-bin in the boiler-room, thus making the room larger and more convenient, and

almost entirely preventing the accumulation of coal-dust, which before was unavoidable. It makes the room comparatively as clean and comfortable as any part of the building, and also dispenses entirely with the services of one man, thus saving about \$600 per year in the pumping expenses.

The new flue which had been under contemplation for some time by the Board, and which takes the place of the old brick flue, is constructed of boiler-iron, and is carried across the top of the boiler, directly over the furnaces, and then across the passage-way through a 30-inch cast-iron pipe to the coal-shed, and thence directly to the chimney.

This flue works very successfully, and gives what was so much needed, — a good draft at all times, — which it was impossible to obtain by the old flue, and by which we are enabled to keep up a uniform pressure of steam all the time, — a very important consideration, especially since the first of January, when the average running time was increased from ten to eighteen hours per day. The heat thrown off from it, also, is more than sufficient to warm the boiler-room, thus doing away with the use of a stove, which has before been indispensable in cold weather, and saving a considerable amount of fuel each year.

FORCE MAIN.

The force main has been in good order, requiring no repairs whatever until the 2d of November, when a considerable leak was discovered in the branch running from Engine No. 2, near the check-valve. On examination, it was found that the flange to the pipe connected with the valve was badly broken. This pipe has since been replaced by a new one, but with the flange very much strengthened at its intersection with the pipe. This break was, no doubt, caused by the concussion of the water in the pipe, together with an insufficient foundation under the check-valve. This has been removed, and replaced by a new and more substantial one.

RESERVOIR.

The reservoir and the grounds about it are in very good order. The old wooden surface-drains have all been removed, and replaced with stone drain-pipe. Bank steps have also been set in the

embankments at different points, and entirely prevent the wearing of footpaths up and down the banks by visitors and others in going about and across the grounds. A blind drain has also been laid for some distance up the driveway leading from South street, to take the top water that was constantly collecting there. This has entirely remedied it. The average depth of water in the reservoir has been 21.7 feet, equal to 25,810,377 gallons. At the gate-house, considerable work has been done the past year. A new 24-inch main has been carried out about seventy feet from the house, to supply the new cement pipe that has been laid around College Hill, the past year, but may ultimately be extended to the city. The screens have also been entirely renewed and re-arranged in the same manner as those at the pipe-chamber, Southern pine timber being used for the frames instead of oak. A new set of screens for the new main have also been put in, arranged in the same manner.

SUPPLY MAIN.

The supply main is in very good order, but two very slight leaks having occurred on it during the year.

The duty of this main has been very much enlarged since the first of January, the consumption reaching, at one time, to nearly 4,000,000 gallons in twenty-four hours, and will no doubt exceed that amount in extreme hot or cold weather; and, should a break occur, would be a very serious matter to the large number of persons that are entirely dependent on it for their daily supply of water. This increased consumption, drawn from a single line of pipe, has somewhat limited the supply to the parties living on the extreme high places in Chelsea and Somerville; but this will be remedied when the new main which the Board contemplate laying shall have been finished.

DISTRIBUTION PIPES.

The distribution pipes, of which there are now about fifty-nine and one-fourth miles, are all in good condition, and continue to give the same satisfaction that they have in past years. On the wrought iron and cement pipe there have been nineteen leaks the past year, of which three were on the newly laid pipe, two were defective

joints, and fourteen were caused by rust. Those caused by rust were mostly on the two and three inch pipe, and were traced in every instance to the poor quality of cement used for the outside covering. There were also ten leaks caused by pick-holes, and were in nearly every case repaired at the expense of the parties making them.

These might be avoided, in most cases, if parties having occasion to open trenches in the streets would first ascertain the exact location of the water-pipes, which can be done on application to the office in City Hall building, thereby saving expense to themselves, and inconvenience to us.

In August, about two hundred and fifty feet of the 12-inch cement pipe on Medford street, in Medford, was lowered about five feet, to conform to the new grade established by the town. This was done in sections of from twenty-four to fifty feet each, and although somewhat of an experiment, was successfully accomplished, and has remained in perfect order up to this time. On Walnut street, in this city, the grade is being lowered to such a depth as will necessitate the relaying of the pipe the whole length of the street, or about five hundred feet. A 1-inch pipe has been laid on one side of the street for a temporary supply, while the grading is going on. Contemplated changes in Front and Alford streets may necessitate the relaying of a portion of the pipe in each street.

In Charlestown, the number of feet of cement pipe laid the past year was 6,005; in Chelsea, 1,637; in Somerville, 26,942; and on College Hill, 2,400. Of cast-iron pipe there was also laid in Charlestown, 63 feet, and in Chelsea, 3,027 feet; making a total of 40,074 feet, or 7 miles and 3,114 feet; making the total amount of distribution pipe connected with the works December 31, 1869, 57 miles and 1,202 feet.

The eight-inch cast-iron pipe, across the Mystic River, at Malden bridge, which was frozen up in December, 1868, and which was somewhat damaged by frost, has been thoroughly repaired during the year, the work being done, by contract, by Mr. George H. Norman, in his usual prompt and efficient manner, the pipe being raised from the bed of the river for the purpose. The repairs were finished, and the water let on again on the 30th of August,

after which it was thoroughly examined by divers, and found to be in perfect order. The pipe has been boxed up or sunk below the bed of the river, where it was exposed before to the weather, and a waste-cock has been put on the pipe, near the Chemical Works, which is kept constantly running in cold weather. With these precautions, this trouble will not probably occur again.

HYDRANTS.

The hydrants are all in good order throughout the city. No additional Lowry hydrants have been set during the year, but six new Flush hydrants have been set, as will be seen by the schedule which follows :—

In Chelsea, three new post hydrants have been set, thirty-five in Somerville, and five on College Hill.

In Charlestown, two new valves have been put into the Lowry hydrants, three into the Flush hydrants, and three decayed boxes have been replaced by others.

GATES.

There have been twenty-three new gates set in Charlestown, mostly on the new line of pipe. Three new stems have been put in, and three old and decayed boxes have been renewed.

In Chelsea, three new gates have been set, twenty-eight in Somerville, and three on College Hill.

There are some sections of pipe in the city that need more gates, as they are liable to be shut off suddenly, in case of a break or leak, or for other reasons, which causes more or less dissatisfaction among the takers, and it is desirable to make the sections as short as possible.

SERVICE PIPES.

There have been three hundred and sixteen new service pipes entered in Charlestown during the year, four hundred and twenty-three in Chelsea, two hundred and fifty-two in Somerville, and six in Medford. The pipe used was nearly all lead, the tin-lined having proved entirely unreliable, and is removed as it gives out, and replaced by lead. Twenty have been removed the past year. In Somerville, a small amount of galvanized iron, and also of ce-

ment was used. Early in the season, an arrangement was made with the Somerville Water Commissioners, by which we put in all the services in Somerville, which is done, in every case, at the expense of the taker, and at the bare cost of labor and materials, thus effecting a large saving in the expense to them.

METERS.

There have been eight new meters set in Charlestown, three in Chelsea, and three in Somerville. Seven have been taken out and replaced by others. Two meters have come under our control at the Hospitals in Chelsea, and two in Somerville, at the Bleachery and American Tube Works ; making the whole number now in use seventy-nine, of which seventy-three are the Worthington, three Blake, one Aubin, and two of the Union Water Meter Co., of Worcester, Mass. These latter were furnished, at their expense, for trial, and so far have proved satisfactory.

DRINKING FOUNTAINS.

The drinking-fountains are one of the "institutions" of the city. They are extensively used, and give great satisfaction to the public. They have required considerable care the past year owing to the corrosion of the iron waste-pipes, thereby stopping the overflow. These are now being removed, and replaced by lead pipe, which will probably prevent this trouble in the future. This same trouble occurs in Chelsea, but is only a fault in the construction and not in the design, and does not affect its success as a drinking-fountain.

The tables which follow show the amount of distribution and service-pipe laid in 1869, and also the whole amount connected with the works December 31, 1869, the whole number of gates and hydrants, and the tools and materials on hand at the end of the year.

EXTENSION OF DISTRIBUTION PIPE IN 1869.

CHARLESTOWN.		Kind of Pipe.	6-inch.		4-inch.		3-inch.		2-inch.		1-inch.		Totals.	CHELSEA.	Kind of Pipe.	8-inch.		6-inch.		4-inch.		Totals.
STREET.			Feet.		Feet.		Feet.		Feet.		Feet.					Feet.		Feet.		Feet.		
Richmond		Cement	321										321									
Auburn		"	240										240									
Park		"		318									318									
Webster		"		249									249									
Beacham		"		424				300					724									
School		"		330									330									
Main		"	8	900									908									
Seyver		"		650									650									
Kingston		"		400									400									
Lincoln		"		234									234									
Ham's Court		"		42					200				242									
"		Iron		27									27									
Salem-Street Avenue		Cement			314								314									
Tremont		"			169								169									
Main		Iron			36								36									
Monument Court		Cement							315				315									
Beach		"							96				96									
Reed's Court		"							150				150									
Perkins		"							130				130									
Tufts		"									65		65									
Brighton		"									150		150									
			569	3574	819	215							6,068									

CHLSEA.	Kind of Pipe.	Feet.	8-inch.	Feet.	6-inch.	Feet.	4-inch.	Feet.	Totals.
	Cement	272					1,365		4,664
	Iron						3,027		
	Cement	5,314					7,847		26,942
	College Hill			1,200			1,200		2,400
			5,586	14,981	13,439				34,006

Total Amount of Distribution Pipe connected with
the Works Dec. 31, 1869.

Charlestown, 120,219 feet.	
Chelsea.... 112,403 "	
Somerville.. 64,840 "	
Medford.... 3,197 "	
Malden..... 858 "	
301,517 feet = 57 miles 557 feet.	

Total Amount of Distribution Pipe connected with
the Works Dec. 31, 1869.

Charlestown, 120,219 feet.

Chelsea..... 112,403 "

Somerville.. 64,840 "

Medford.... 3,197 "

Malden..... 858 "

301,517 feet = 57 miles 557 feet.

SERVICE PIPES CONNECTED WITH WORKS DECEMBER 31, 1869.

Entered in 1869.	3-inch.	2-inch.	1½-inch.	1¼-inch.	1-inch.	¾-inch.	½-inch.	¼-inch.	Total ft.	Total No. of feet Services.
Charlestown.....		35			135	328	1,333	5,703	7,534	Charlestown } Somerville.. } 155,432 feet. Medford.... } Chelsea..... 61,567 "
Somerville.....					684	674	3,641	4,560	9,564	
Medford.....						22		133	155	
Whole amount in 1869.....	47	1,393	496	14	3,388	1,774	27,516	107,224	138,279	
" " previous.....										
Corporation Stops used in 1869	1				3	13	70	239	326	Total 216,999 feet.
Service " "						17	155	486	651	
Corporation used prior to "	3	1	1	1	33	63	805	3,789	4,695	
Service " "			1	3	38	68	682	4,742	5,534	

ENGINE RECORD.

Months.	Pumping time per month.	Number of strokes per month.	Number of lbs. of wood per month.	Coal used.			Loss by banking.	Loss by clinkers.	Average No. of strokes per minute.
				Banking.	Pumping.	Total.			
	Hours. Min.	Strokes.	Lbs.	Lbs.	Lbs.	Lbs.	Per cent.	Per cent.	Strokes.
1869.									
January	416.45	1,160,900	200	148,200	190,400	238,600	20.2	10.4	46.4
February	382.55	1,055,769	600	45,400	186,000	231,400	19.6	9.2	46.0
March	445.45	1,181,228	530	50,000	215,909	265,900	18.7	11.4	44.1
April	290.45	759,248	80	44,000	121,000	165,000	26.6	10.2	44.1
May	293.05	778,480	80	42,260	120,700	164,700	26.6	9.4	44.2
June	313.05	851,360	780	44,000	143,700	185,960	22.7	10.3	45.3
July	342.50	930,952	655	44,000	165,500	209,500	21.0	11.1	45.2
August	341.50	932,148	400	42,200	172,400	216,600	20.4	13.0	45.4
September	324.05	900,336	520	42,200	164,200	206,400	20.4	12.6	46.3
October	293.15	843,312		43,600	151,500	195,100	22.3	9.8	40.7
November	313.25	862,532		20,400	150,400	170,800	11.9	8.5	45.3
December	314.10	907,064	500	21,700	170,000	191,700	10.8	7.4	48.1

TABLE OF OBSERVATIONS AT LAKE, AND OF THE DISTRIBUTION OF WATER.

Months.	Depth of water above bottom of conduit.		Surface of lake	Depth of water on six-foot overfall.	Depth of water in reservoir.	Ounces of water in rain-gauge.	Rain fall in inches.	Temperature of water in gate house.	Mercury in the shade.			Gallons of water consumed per month.	Gallons of water consumed per day.	Average number to each inhabitant.	Average number to each consumer.
									6 A. M.	12 M.	6 P. M.				
January	4.6	10.0	3.8	21.3	227	2.27	33	33	20	38	25	88,990,679	2,870,667	58	66
February	4.6	10.1	11.5	21.7	359	3.59	33	33	18	31	20	80,775,193	2,884,828	59	66
March	4.6	10.1	9.4	21.7	532	5.32	36	36	20	33	23	90,132,404	2,813,961	57	65
April	4.6	10.0	8.0	21.8	169	1.69	45	45	38	56	45	60,597,714	1,951,977	39	46
May	4.6	10.3	4.5	21.6	175	1.75	59	59	30	42	38	58,703,960	1,964,644	39	46
June	4.6	10.1	3.0	21.5	238	2.38	68	68	50	72	65	64,016,872	2,153,896	43	51
July	4.6	9.9	1.0	21.8	268	2.68	70	70	60	74	66	71,627,440	2,252,716	44	52
August	4.6	9.7		22.0	237	2.37	75	75	61	71	67	68,945,562	2,224,050	44	52
September	4.6	10.3		21.8	631	6.31	70	70	60	72	68	69,301,274	2,310,042	44	53
October	4.6	10.2	3.0	21.8	426	4.26	69	69	42	51	45	64,619,779	2,084,509	41	51
November	4.6	10.2	2.5	21.2	150	1.50	52	52	25	37	28	66,865,772	2,228,855	43	51
December	4.6	10.5		21.4	359	3.59	33	33	16	28	20	69,833,217	2,252,717	43	51

The conduit is 5 feet 8 inches high.

High water mark in lake, 11 feet 2 inches above bottom of conduit.

MATERIALSON HAND IN PIPE YARD.

Iron Pipe.

36 feet, of 36 inch pipe (sound).

12 " 30 " "

144 " 30 " (cracked).

336 " 24 " "

2 sleeves, 36 inch (whole).

5 " 30 " "

6 " 24 " "

3 " 30 " (clamp).

2 " 24 " "

1 gate gear, 24 inch.

200 pounds old iron.

100 feet lead pipe.

1 pair callipers,

6 casks nails.

5 casks cement.

500 common brick.

TOOLS AND MATERIALS ON HAND AT ENGINE HOUSE.

3 Iron Bars ; 1 Sledge ; 1 Portable Forge ; 1 Truck ; 1 Deferential Block ; 1 Ratchett ; 1 Level ; 1 Plane and Square ; 1 pair Bellows ; 1 pair Hand-bellows ; 2 pairs Tongs ; 30 Wrenches ; 2 Fairbanks Scales ; 1 Hand-drill ; 8 Files ; 1 Chisel ; Tap and Dies ; 1 Grindstone ; 13 Coldchisels ; 1 set Pipe Dies ; 1 Anvil ; 2 Vises ; 3 Saws ; 1 Die-stock ; 3 Brass Lanterns ; 150 feet Hose, $2\frac{1}{2}$ inch ; 8 feet Hose, $1\frac{1}{2}$ inch ; 90 feet Hose, $\frac{3}{4}$ inch ; 2 sets Fire-irons ; 3 Shovels ; 1 Coal Car ; 108 lbs. Cast Iron ; 504 lbs. Wrought Iron ; 13 feet Pipe, $2\frac{1}{2}$ inch ; 21 feet Pipe, 1 inch ; 65 feet Pipe, $\frac{1}{2}$ inch ; 18 feet Pipe, $\frac{3}{8}$ inch ; $24\frac{3}{4}$ lbs. Martin's Packing ; 35 Sheets Emery Paper ; 3 Brooms ; 2 Pails ; 2 Wheelbarrows ; $\frac{3}{4}$ bbl. Soap ; 3 Oil Cans ; 370 Fire Brick ; 1 Brass Tray, with 2 Oil Fillers ; $1\frac{1}{2}$ bbl. Kaolin ; 4 galls. Sperm Oil ; $4\frac{1}{2}$ Cords Wood ; 2 Desks ; 1 Table ; 2 Clocks.

TOOLS AT GATE HOUSES.

2 Iron Bars ; 3 Chains ; 3 Bog Hooks ; 3 Nets ; 3 Grapples ; 2 Ice Chisels ; 1 Ice Hook ; 3 Boat-hooks ; 1 Boat ; 4 Oars ; 3 Hoes ; 4 Shovels ; 5 Wheelbarrows ; 1 Hammer ; 1 Sledge ; 1 Trowel ; 5

Pails ; 1 Oil-can ; 3 Drills ; 6 Chisels ; 3 Picks ; 1 Spade ; 2 Iron Rakes ; 1 Wooden Rake ; 1 Scythe ; 1 Derrick ; 2 sets Falls and Blocks ; 50 lbs. Rope ; 1 Iron Roller ; 3 Pumps ; 1 Table ; 1 Stove ; 1 Grass-cutter.

MATERIALS ON HAND AT THE SHOP AND YARD IN CHARLESTOWN.

Hydrants.

1 Lowry Hydrant ; 1 Side do. ; 2 Barrels for Lowry's ; 13 Covers and Frames for do. ; 3 Caps for do. ; 2 Valves and 5 Wastes for do. ; 4 Side Hydrant Valves ; 10 Hydrant Wrenches ; 9 Hydrant Washers ; 1 Valve Wrench ; 3 Hydrant Chucks ; 2 pairs Hydrant Tongs.

Meters.

2 Meters, 2 inch ; 1 Meter, 1 inch ; 1 Meter, $\frac{5}{8}$ inch, of the Worthington pattern ; 1 Meter, 1 inch ; 1 Meter, $\frac{3}{4}$ inch, of the Worcester pattern ; 1 Meter, 2 inch, and 1 $\frac{5}{8}$ inch, of the Aubin pattern ; 2 Meters, $\frac{5}{8}$ inch, of the Blake pattern ; 1 Meter, $\frac{5}{8}$ inch, of the Hartford pattern ; 14 Unions, 2 inch ; 9 do., 1 inch ; 8 do., $\frac{5}{8}$ inch ; 2 Couplings, $\frac{1}{2}$ inch ; Mineral Paint, 30 lbs. ; Tanks for testing.

DISTRIBUTION DEPARTMENT.

84 feet Cement Pipe, 16 inch ; 8 feet do., 12 inch ; 40 feet do., 8 inch ; 175 feet do., 6 inch ; 189 feet do., 4 inch ; 308 feet do., 3 inch ; 1 Branch, 8×4 inch ; 1 do., 10×4 ; 120 feet Iron Pipe, 16 inch ; 5 feet do., 12 inch ; 120 feet do., 8 inch ; 96 feet do., 6 inch ; 216 feet do., 4 inch ; 12 feet do., 3 inch ; 2 Iron Branches, 8×8 inch ; 1 do., 4×4 inch ; 7 Quarter Bends, 4 inch ; 1 Reducer, 8 to 6 ; 2 do., 6 to 4 ; 4 Sleeves, 16 inch ; 1 do., 12 inch ; 1 do., 8 inch ; 2 do., 6 inch ; 3 do., 4 inch ; 2 Gates, 10 inch ; 1 do., 8 inch ; 1 do., 6 inch ; 12 Gate Frames and Covers ; 3 Meter do. ; 1 Furnace ; 1 Derrick and Fall ; 1 bbl. Black Varnish ; 4 pairs Rubber Mittens ; 2 Mortar Boxes ; 1 Tool-chest ; 2 Coils Rope ; 16 lbs. Rivets ; 4 Street Horses ; Hot Water Kettles ; 2 Punches ; 4 Pails ; 6 Hammers ; 9 Caulking-hammers ; 4 Coldchisels ; 1 pair Shears ; 6 yds. Enamelled Cloth ; 10 yds. Cotton Cloth ; 100 lbs. Red Lead ; 10 Pumps.

SERVICE DEPARTMENT.

Lead Pipe,—260 lbs., 2 inch ; 708 lbs., $1\frac{1}{2}$ inch ; 645 lbs., $\frac{3}{4}$ inch ; 976 lbs., $\frac{5}{8}$ inch ; 6975 lbs., $\frac{1}{2}$ inch ; 27 Service Covers ; 127 lbs. Strap Solder, 138 do. Common ; 367 lbs. Pig Lead ; 13 Service Boxes ;

15 lbs. Block Tin; 44 lbs. Bismuth Solder; 4 Paving Hammers; Soldering Irons; 2 Plumbing Irons; $\frac{3}{4}$ barrel Resin; 1 Furnace; 34 Soldering Nippers; 60 lbs. Nails; 3 Ladles; 3 Trowels; 2 Tape Lines; 1 barrel Cement; 3 Screw drivers; 3 Monkey-wrenches; 6 Bushings, 1 inch; 36 couplings; 10 Plugs, $\frac{3}{4}$ inch. *Corporation Stops*,—8 Stops, $1\frac{1}{2}$ inch; 59 do., 1 inch; 56 do., $\frac{3}{4}$ inch; 37 do., $\frac{5}{8}$ inch; 85 do., $\frac{1}{2}$ inch. *Service Stops*,—63 Stops, 1 inch; 146 do., $\frac{3}{4}$ inch; 20 do., $\frac{5}{8}$ inch; 63 do., $\frac{1}{2}$ inch. *Drills for Cement Pipes*,—1 Drill, 2 inch; 1 do., 1 inch; 1 do., $\frac{3}{4}$ inch; 1 do., $\frac{5}{8}$ inch; 1 do., $\frac{1}{2}$ inch. *Drills for Iron Pipe*,—1 Drill and Tap, 2 inch; 1 do., $1\frac{1}{2}$ inch; 1 do., 1 inch; 1 do., $\frac{3}{4}$ inch; 1 do., $\frac{1}{2}$ inch; 1 do., $\frac{1}{4}$ inch; 250 feet Cement service Pipe, 1 inch; 410 feet, $\frac{3}{4}$ inch; 10 feet Galvanized Iron, 3 inch.

MISCELLANEOUS.

2 pairs Tongs, 2 inch; 1 do., $\frac{3}{4}$ inch; 1 do., $\frac{1}{2}$ inch; 6 Iron Bars; 19 Picks; 26 Shovels; 10 Lanterns; 8 Nut Wrenches, 8 Stop Cock do., 8 Gate do.; 1 Spirit Level; 2 Ladders; 1 pair Scales; 1 Mallet; 2 Saws; 1 Steel Square; 2 axes; 3 pairs Pliers; 3 Stone Drills; 3 Cutting Chisels; 2 Wood Chisels; 1 pairs Callipers; 1 Vise; 1 Grindstone; 1 Stove; 1 Wheelbarrow; 1 Handcart; 4 Oil Cans; 1 box Painter's Cement.

CHARLES H. BIGELOW, *Superintendent.*



MYSTIC WATER BOARD.

1870.

EDWARD LAWRENCE,

FRANCIS CHILDS,

LYMAN R. BINGHAM,

} *From the Citizens at Large.*

PETER S. ROBERTS,

From the Board of Aldermen.

ENOS MERRILL,

From the Common Council.

WM. W. PEIRCE,

Clerk and Registrar.

CHARLES H. BIGELOW,

Superintendent of the Works.